QUALITY ASSURANCE PROJECT PLAN

FOR REMEDIAL INVESTIGATION OF THE BAYONNE BARREL AND DRUM SITE NEWARK, NEW JERSEY

Prepared for:

PRP Group / *de maximis, inc.*

March 28, 2003

QUEST

Environmental & Engineering Services, Inc.

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Prepared for:
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Prepared by:
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Preface

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, functional activities, and specific Quality Assurance (QA) and Quality Control (QC) activities associated with the sampling activities specified in the January *2003 Remedial Investigation Workplan* for the Bayonne Barrel and Drum Site. This QAPP also describes the specific protocols that will be followed for sample handling and storage, chain-of-custody, and laboratory and field analyses. All QA/AC procedures will be in accordance with applicable professional technical standards, regulatory regulations and guidelines, and specific project objectives. This QAPP is prepared by Quest Environmental & Engineering Services, Inc. (Quest) and is consistent with requirements appearing in the United States Environmental Protection Agency (USEPA) *Guidance for Quality Assurance Project Plans* (EPA QA/G-5, December 2002) and the New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (N.J.A.C. 7:26E). Any party generating data under this remedial investigation program has the responsibility to implement the QA/QC procedures of this QAPP to assure that the precision, accuracy, completeness, and representativeness of the data are known and documented.

Acronyms and Abbreviations

CALUX	Chemically-Activated Luciferase Expression
CLP	Contract Laboratory Program
COC	Chain-of-Custody
CRDL	Contract Required Detection Limits
CRQL	Contract Required Quantitation Limits
DQO	Data Quality Objectives
GC/MS	Gas Chromatograph/Mass Spectrometer
ICP	Inductively Coupled Plasma Emission Spectrometer
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NJDEP	New Jersey Department of Environmental Protection
PCB	Polychlorinated Biphenyl
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
ppb	parts per billion
ppm	parts per million
PQL	Practical Quantitation Limit
PRP	Primary Responsible Party
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAS	Routine Analytical Services
RIW	Remedial Investigation Workplan
RPD	Relative Percent Difference
SOP	Standard Operation Procedure
TAL	Target Analyte List
TCL	Target Compound List
USEPA	United States Environmental Protection Agency

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A. PROJECT MANAGEMENT

This section describes the administrative functions, project objectives, and approaches to be followed for the remedial investigation program.

A.1 Project/Task Organization

Quest Environmental & Engineering Services, Inc. (Quest) maintains overall technical responsibility for conducting the sampling activities specified in the Remedial Investigation Workplan (RIW). As such, Quest will perform field sampling, tabulate and evaluate the data, and provide QA/QC oversight. The management of technical and administrative aspects of the project will be accomplished by *de maximis, inc.*, Quest, NJDEP, and USEPA Region 2.

To date, the following key personnel are assigned to the project:

Affiliation	Title	Name	Telephone Number
de maximis, inc.	Project Coordinator	William J. Lee	(908) 735-9315
Quest Environmental & Engineering Services, Inc.	Project Manager Field and QA/QC Manager	Darin Vogel Kenneth Swider	(908) 735-8600 (908) 735-8600
STL Edison	Laboratory Project Manager	Deanna Doster	(888) 722-4897
NJDEP	Project Manager	Stephen Kehayes	(609) 777-0649
USEPA Region 2	Project Manager/OSC	Joseph Consentino	(732) 906-6983

A.1.1 Project Coordinator

Responsibilities and duties of the Project Coordinator (*de maximis*) include:

- Define project objectives and establish project policy and procedures to address the specific needs of the project as a whole, as well as objective of each task;
- Monitor and direct field activities;
- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Approve reports prior to their submission to NJDEP/USEPA Region 2; and

- Represent the PRPs at public meetings.

A.1.2 Project Manager/Field Services Manager

Responsibilities and duties of the Project manger and Field Services Manager (Quest Environmental & Engineering Services, Inc.) include the following.

Project Manager

Responsibilities and duties of the Project Manager include the following:

- Provide overall direction and management of Quest activities as defined RIW;
- Provide QA management of all project aspects within the responsibility of Quest;
- Final review of all documents prepared by Quest
- Assure corrective actions are made for deficiencies; and
- Represent the project team at public meetings.

Field Manager

Responsibilities of the Field Manager include:

- Instruct field staff;
- Direct and participate in field work activities;
- Coordinate field and laboratory schedules;
- Coordinate field activities with the Project Manager;
- Review/approve the type of field equipment used and insure that procedures are followed to obtain the data quality objectives;
- Review the field instrumentation calibration and maintenance logs to insure data quality objectives are met;
- Review field notebooks, logs with respect to completeness, consistency, and accuracy; and
- Prepare draft fined reports, including a summary of field activities, with an evaluation of internal field audit results.

A.1.3 Quality Assurance Manager

Quality Assurance Manager

Responsibilities and duties of the Quality Assurance Manager (QAM - Quest) include the following:

- Review laboratory data packages;
- Serve as primary communication link with the analytical laboratory;
- Review field reports; and
- Review audit reports;

- STL?

A.1.4 Analytical Laboratory

Responsibilities and duties of the analytical laboratory include the following:

- Perform sample analyses and associated laboratory QA/QC procedures;
- Supply sampling containers and shipping cartons;
- Maintain laboratory custody of sample; and
- Adhere to all protocols in the QA/QC Plan.

Should specify here

Laboratory Project Manager

- Serve as primary communication link between Quest, sampling personnel, and laboratory technical staff;
- Monitor work loads and ensure availability of resources;
- Oversee preparation of analytical reports;
- Supervise in-house chain-of-custody; and
- Coordinate/supervise activities with other laboratories as necessary.
- Oversee the quality assurance aspects of the data; and
- Verify final analytical data prior to transmittal to Quest.

A.1.5 USEPA/NJDEP

Responsibilities and duties include the following:

- Monitor progress of remedial action;
- Ensure that all activities are performed in compliance with applicable Federal and State requirements; and
- Coordinate communication between USEPA, NJDEP, and *de maximis. inc.*

A.2 Project Background and Objectives

A.2.1 Project Background

The Bayonne Barrel and Drum Site (site) occupies approximately 15 acres of land located in an industrial area of Newark, Essex County, New, Jersey. The Bayonne Barrel and Drum Company operated as an unlicensed treatment, storage and disposal (TSD) facility on the property from 1940 to the early 1980's when the company filed for bankruptcy under Chapter 11. Drum cleaning and reclamation operations included washing of open and closed-head drums and incineration of open head drums. Subsequently in March 1993, the US Environmental Protection Agency (USEPA) conducted activities to remove material having the Resource Conservation and Recovery Act (RCRA) characteristic of ignitability contained in abandoned trailers. Following a fire at the site on July 8, 1994, USEPA commenced additional site inspection/characterization and removal activities under the Removal Action Branch. Inspections revealed ash piles, shredded tires, aboveground and underground storage tanks, contamination within buildings, and the presence of thousands of drums, some containing hazardous substances. Removal activities included:

1. Securing the site with measures such as perimeter fence repair and warning signs;
2. Removal of approximately 46,000 drums, some containing hazardous substances;
3. Testing, segregating, and over packing hazardous substances;
4. Removal of two ash piles contaminated with dioxin and lead;
5. Removal of tanks containing contaminated sludge.

Sampling conducted during various investigations conducted between 1985 to 1999 indicated the presence of numerous organic and inorganic contaminants in soil that exceed NJ Soil Cleanup Criteria including petroleum hydrocarbons, pesticides, volatile organic compounds, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals (such as lead, arsenic, zinc) and polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDDs/PCDFs). The investigations also revealed the presence of historic fill across a majority of the site. The earlier assessments attributed many of the remaining contaminants of concern to the historic fill. Ground water sampling also revealed the presence of some contaminants in ground water.

Based on the results of these investigations, a draft Statement of Work was developed during February 2002 to control the sources of contamination and reduce or minimize the migration of the contamination that would allow for brownfield redevelopment of the site in conjunction with the City of Newark and a private developer. The USEPA, in review of the data and draft SOW, requested additional investigation of soil in portions of the Northern Building Complex that had not been sampled during the prior investigations in order to complete the characterization of the entire site. This investigation was completed during July-August 2002 and indicated that the remedial activities outlined in the draft SOW would also be applicable to areas in the Northern Building Complex.

During August 2002, the PRP Group requested the New Jersey Department of Environmental Protection (NJDEP) to review the Draft SOW and prior site data for approval of the proposed remedial activities. After their review, the NJDEP requested that additional sampling be conducted that would address the remedial investigation requirements of the Technical Requirements for Site Remediation (TRSR) before an approval could be issued regarding the Draft SOW.

A.2.2 Project Objectives

The purpose of the remedial investigation is to provide information necessary to further characterize and delineate soils and ground water for evaluation of remedial activities. Specific objectives include:

- Identify soil samples and ground water samples to be collected;
- Identify the sampling methods to be employed;
- Provide shipping and field chain-of-custody (COC) documentation procedures;
- Identify the types of analyses that will be performed with appropriate USEPA analytical method references; and
- Provide QA/QC objectives and procedures to be followed.

This QAPP presents the organization, objectives, functional activities, and specific Quality Assurance (QA) and Quality Control (QC) activities associated with the sampling activities specified in the *March 28, 2003 Remedial Investigation Workplan.* This QAPP also describes the specific protocols that will be followed for sample handling and storage, chain-of-custody, and laboratory and field analyses.

The sample network design and rationale for sample locations are described in detail in the RIW.

A.2.3 Project Schedule

The Project Schedule is presented as Table 1.

A.3 Data Quality Objectives and Criteria

A.3.1 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during site-related activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. Three analytical categories address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. These categories are:

Screening Data: Screening data affords a quick assessment of site characteristics or conditions. This objective for data quality is available for data collection activities that involve rapid, non-rigorous methods of analysis and quality assurance. This objective is generally applied to: physical and/or chemical properties of samples, degree of contamination relative to concentration differences; and preliminary health and safety assessment.

Screening Data with Definitive Confirmation: Screening data will provide rapid identification and quantitation, although the quantitation can be relatively imprecise. This objective of data quality is available for data collection activities that require qualitative and/or quantitative verification of a select portion of sample findings (10 percent or more). This objective can also be used to verify less rigorous laboratory-based methods.

Definitive Data: Definitive data are generated using analytical methods, such as approved USEPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce raw data

(e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files.

It is anticipated that each category will be used during the investigation. Field screening techniques will be used to evaluate potential concentration of constituents of concern prior to sample submission (i.e., PID screening). Samples collected for the analysis of dioxins will be performed using a laboratory screening method with a percentage analyzed for definitive confirmation. All other parameters will be measured using definitive procedures. The intended uses and DQOs for each parameter are summarized in Table 2.

method + % specified

A.3.2 Data Quality Criteria

The purpose of this section is to address the specific data quality criteria for accuracy, precision, completeness, representativeness, and comparability.

Is this the case for each matrix + analytical method?

Accuracy: Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, reference standards, matrix spikes, blank spikes, and surrogates will be used to assess the accuracy of the laboratory analytical data. Specific measures of accuracy are listed below. Accuracy limits for laboratory analyses will be as specified in the methods.

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of matrix spike/matrix spike duplicate samples, surrogates, and blanks. The percent recovery (%R) of matrix spike samples will be calculated using the equation below:

$$\%R = \frac{A - B}{C} \times 100$$

Where:

A = The analyte concentration determined experimentally from the spiked sample.

B = The background level determined by a separate analysis of the unspiked sample.

C = The amount of the spike added.

Precision: Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision. To maximize precision, sampling and analytical procedures will be followed. All work for these sampling and analytical efforts will adhere to established protocols presented in the RIW. Checks for analytical precision will include the analysis of matrix spike duplicates, laboratory duplicates, and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Precision limits for the laboratory analyses will be specified in the methods.

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate (MS/MSD) for organic analysis, and laboratory duplicate analyses for inorganic analysis. Precision of field measures will be assessed using field duplicates. The relative percent difference (%RPD) will be calculated for each pair of duplicate analysis using the equation below:

$$\% \text{ RPD} = \frac{S - D}{(S + D) / 2} \times 100$$

Where:
S = First sample value (original or MS value); and
D = Second sample value (duplicate or MSD value).

Completeness: Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the amount that was expected to be obtained under normal conditions. Completeness of laboratory tests are expected to be 90% or better.

The data completeness of analytical results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using the equation below.

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100$$

Representativeness: Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability. The presence of target constituents will be addressed, as well as supplemental parameters at the time of sampling. The RIW presents field sampling methodologies and laboratory analytical methodologies. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide data representative of site conditions. Information on analyte specific holding time and preservative requirements is provided in Table 1-1.

Comparability: Comparability is the degree of confidence with which one data set can be compared to another. Comparability will be maintained through consistent sampling and analytical methodologies set forth in the RIW and USEPA standard analytical methods, and through the use of QAPP procedures and appropriately trained personnel. The comparability of data from previous studies with data generated by the RIW is limited by uncertainties associated with sampling (i.e., incorrectly identified sampling points, variability in sampling protocols, and migration of constituents of concern) and analytical differences (i.e., undocumented methods and detection limits, deviations from protocol, and insufficient or undocumented data review).

The comparability of split sample data depends on sample and subsample handling techniques and analytical methods, as well as laboratory procedures and performance. Analysis of samples by the analytical methods identified in the QA/QC Plan is required to allow a comparison of split data by other laboratories.

Sensitivity: The sensitivity of an analytical method is definitely by the method detection limit (MDL). The MDL defined in USEPA 40 CFR Part 136 is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the value is above zero.

The achievement of method detection limits (MDLs) depend on instrumental sensitivity and matrix effects. Therefore it is important to monitor the instrumental sensitivity to ensure the data quality though constant instrument performance. The method detection limit is defined as the minimum concentration of a substance that can be measured with 99% confidence that the concentration is above zero. MDL is calculated as follows:

$$MDL = t_{(n-1,\ 1-a=0.99)} \quad x \quad s$$

Where:

s = standard deviation of replicate analysis

$t_{(n-1,\ 1-a=0.99)}$ = student's t-value for a one-sided 99% confidence level and a standard deviation estimate with n-1 degrees of freedom

Laboratory-determined MDLs may vary based on matrix and instrument sensitivity. Quantitation limits are typically two to ten times the MDL.

Field Measurements

Field data will be assessed by the Field Manager and QAM. The field results will be reviewed for compliance with the established QC criteria that are specified in the QAPP and RIW. Accuracy of the field measurements will be assessed using daily instrument calibration, calibration check, and analysis of blanks. Precision will be assessed on the basis of reproducibility by multiple reading of a single sample.

A.4 Special Training/Certifications

Field personnel will adhere to the procedures specified in the Health and Safety Plan (HSP) and will have met the following requirements prior to performing field sampling:

- 40-hour training course that meets the requirements of 29 CFR Part 1910.120(e) on health and safety at hazardous waste sites; and
- 8-hour refresher course within the last 12 months that meets the requirements of 29 CFR Part 1910.120(e) on health and safety at hazardous waste sites.

The Health and Safety Officer will be responsible for ensuring that field personnel have current health and safety training. Field personnel will be properly trained in equipment use and procedures necessary for field sampling prior to entering the field. Each contractor will employ their internal procedures for establishing that personnel are adequately experienced and trained in the duties they are expected to perform. The requirements of the QAPP will be reviewed by management and field personnel to ensure

that persons with appropriate credential and experience are assigned to the tasks to be performed. It will be the responsibility of the Field Manager to ensure that field personnel understand and comply with the applicable QAPP requirements.

Personnel performing laboratory analyses will be properly trained by the laboratory's designee to conduct the various laboratory analyses described in this QAPP. The laboratories participating in the project will have NJDEP certification for performing the specified method analyses, if applicable. Data verification and validation will be under the QA Manager who is experienced with the production, reporting, verification, and validation of analytical data.

A.5 Documentation and Records

This QAPP will be distributed to all personnel responsible in the collection, generation, and interpretation of field and analytical data. Analytical data will be reported in an analytical data package and in an Electronic Data Deliverable (EDD) in accordance with the NJDEP HAZSITE Database. Data packages will be provided as a paper copy and in an Adobe® Acrobat® .pdf electronic format.

Appropriate records will be maintained to provide adequate documentation of the remedial investigation. Appropriate records include:

- field records including description of daily activities, boring logs, well construction logs, well sampling logs, and photographs;
- laboratory data deliverables;
- data validation reports;
- field/lab audit reports;
- custody documentation; and
- results reports and drawings.

B. DATA GENERATION AND ACQUISITION

B.1 Sampling Process Design

The sample network design and rationale for sample locations are described in detail in Section 3 of the RIW. The sampling will involve the collection of soil and ground water samples. Sample matrices, analytical parameters and frequencies of sample collection can be found in Tables 3 and 4 of this QAPP.

B.2. Sampling Methods

Soil sampling methods include collecting samples using a hand auger and using a Geoprobe®. Section 3 of the RIW describes the sampling methods to be employed at each sample location. Procedures for each method are presented in Appendix E (Hand Augering) and Appendix F (Soil Boring Completion and Sampling Using the Geoprobe®). Ground water samples will be collected using conventional purging and sampling for all analytical parameters with the exception of metals as described in Section 3 of the RIW. Low flow sampling will be used for the collection of metal samples. Appendix K of the RIW provides the procedures to be used for both conventional sampling and low flow sampling.

B.3 Sample Handling and Custody

Sample handling and custody involves three parts: sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if it:

- Is in your possession;
- Is in your view, after being in your possession;
- Was in your possession and you placed it in a secured location; or
- Is in a designated secure area.

B.3.1 Field Sample Custody

The objective of field custody is to assure that the samples are not tampered with from the time of collection through time of transport to the analytical laboratory. Field custody documentation consists of both field logbooks and field chain-of-custody forms.

Field Logbooks

Field logbook will provide the means of recording data-collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the site could re-construct a particular situation without reliance on memory.

Field logbooks will be bound, field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in a secure location when not in use. Each logbook will be identified by the project-specific designation. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned;
- Logbook number;
- Project name;
- Project start date; and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the RIW. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification number will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

Sample Containers and Preservation

A summary of the recommended bottle types and preservation is provided in Table 3. All bottles used will be supplied by the laboratory. The bottles will be purchased pre-cleaned to USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9240.05A requirements.

Sample Labeling

Preprinted sample labels will be affixed to sample bottles prior to delivery at the sampling site. The following information is required on each sample label:

- Project;
- Date collected;
- Time collected;
- Location;
- Sampler;
- Analysis to be performed;
- Preservative; and
- Sample number

Field Chain of Custody

Completed chain-of-custody (COC) forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original COC form will accompany the sample to the laboratory. Copies of the COC will be made prior to shipment (or multiple copy forms used) for field documentation. The COC forms will remain with the samples at all times. The samples and signed COC forms will remain in

the possession of the sample crew until the samples are delivered to an express carrier (e.g., Federal Express) or hand delivered to a mobile or permanent laboratory, or placed in secure storage.

Sample labels are completed for each sample using waterproof ink unless prohibited by weather conditions. The labels include sample information such as: sample number and location, type of sample, date and time of sampling, sampler's name or initials, preservation, and analyses to be performed. The completed sample labels are affixed to each sample bottle and covered with clear tape.

Whenever samples are co-located with a source or government agency, a separate Sample Receipt is prepared for those samples and marked to indicate with whom the samples are being co-located. The person relinquishing the sample to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refused, this is noted in the "Received By" space.

Sample Packaging and Shipping

Sample packaging and shipment procedures are designed to insure that the sample will arrive at the laboratory, with the COC, intact.

Samples will be packaged for shipment as outlined below:

- Ensure that all sample containers have the sample labels securely affixed to the container with clear packing tape;
- Check the caps on the sample containers to ensure that they are properly sealed;
- Wrap the sample containers in bubble wrap or other cushioning material;
- Place 1 to 2 inches of cushioning material at the bottom of the cooler;
- Place the sealed sample containers into the cooler;
- Place ice in plastic bags and seal. Place loosely in the cooler;
- Fill the remaining space in the cooler with cushioning material;
- Place chain of custody forms in a plastic bag and seal. Tape the forms to the inside of the cooler lid;
- Close the lid of the cooler, lock and secure with duct tape;
- Wrap strapping tape around both ends of the cooler at least twice;

Be sure to indicate co-located samples. D, O, KMS

- Mark the cooler on the outside with the following information: shipping address, return address, "Fragile" labels, and arrows indicating "this side up". Cover the labels with clear plastic table. Placed a signed custody seal over the cooler lid.

All samples will be hand-delivered or delivered by an express carrier within 24 hours of the time of collection. All shipments will be accompanied by the COC form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records. If the samples are sent by common carrier, a bill of lading should be used. Receipts or bills of lading will be retained as part of the permanent project documentation. Commercial carriers are not required to sign off on the COC form as long as the forms are sealed inside the sample cooler and the custody seals remain intact.

B.3.1 Laboratory Custody

Laboratory Sample Receipt

Samples will be received at the laboratory by a designated Sample Custodian. The Sample Custodian will remove the samples from the cooler and compare the sample labels with the information provided on the chain-of-custody form. If applicable, sample preservation, including temperature, is checked upon sample receipt (volatile water sample preservation is checked at the time of screening). When "compromised" samples are received, it is documented in the project folder and brought to the immediate attention of the Laboratory Project Manager. Samples will be considered "compromised" if the following conditions are observed upon sample receipt:

- Cooler and/or samples are received outside of temperature specification.
- Samples are received broken or leaking.
- Samples are received beyond or close to the holding time.
- Samples are received without appropriate preservative.
- Samples are received in inappropriate containers.
- COC does not match samples received.
- COC is not properly completed or not received.
- Breakage of any Custody Seal.
- Apparent tampering with cooler and/or samples.

- Headspace in volatiles samples.
- Seepage of extraneous water or materials into samples
- Inadequate sample volume.
- Illegible, impermanent, or non-unique sample labeling.

The Project Manager will be contacted for instructions on whether to proceed with analysis. If analysis is performed, the project report will clearly indicate any of the above conditions and resolutions.

Samples will be logged into a Laboratory Information Management System (LIMS) to uniquely identify and track samples and analytical data throughout the facility. The laboratory additionally will maintain a hand-written master log as a parallel paper system backup. The following information will be entered into the computer:

- Job number (unique to the job or set of samples)
- Date received
- Sample Data
- Sample matrix
- Client's name
- Client's Site Name or Number
- Billing information – purchase order numbers
- Sample number (unique to this sample)
- Refrigerator location
- Data analytical results due
- Turnaround Time
- Number of containers
- Additional comments
- Client's address
- Analyses requested
- Notation of special handling instructions
- Deliverable Requirements

This information will be stored as part of the Laboratory project data which is identified by a unique Job Number. Two labels with this number will be placed on each container

of the sample (one on the side and one on the top). If there is more than one container per sample, a letter suffix will be assigned to track each container. The laboratory number, letter suffix, and a description of the container will be recorded in the Laboratory Job Number comment section. Once labeled, the samples will be placed in the appropriate storage area. Once the Laboratory Job Number has been generated, method specific analytical worksheets are generated for distribution to the appropriate supervisors and analysts. A secondary review of the Laboratory Job Number is carried out by the Laboratory Project Manager to ensure compliance with project requirements.

Laboratory Sample Storage

Samples will be stored in locked refrigerators maintained at 4° C. When the laboratory is ready to analyze a sample, an analyst will request the appropriate sample aliquot from the Sample Custodian by presenting their sample request worksheet. The analyst may be required to sign an internal chain-of-custody form when removing the sample aliquot from the sample management area based on the project requirement.

When the analysis is complete, the analyst will return the sample to the custodian and relinquish custody. Samples will be stored in the refrigerators until their established disposal date. When the storage period expires, the samples will be removed from the refrigerator for disposal. All unused solid samples removed from the refrigerators will be packed for disposal and tested to insure compliance with applicable state and federal guidelines.

B.3.3 Document Custody

Laboratory Document Control

The goal of the Document Control Program is to assure that documents for a specified project will be accounted for when the project is complete. Document control will begin with the initial client contact and continue throughout the project to include correspondence, faxed information, and phone logs. This information will be kept by the Laboratory Project Manager for the duration of the project. When the project is complete, the information will be filed in the project case file by the Document Control Officer. Internal COC forms will be maintained by the Sample Custodian until sample disposal. Upon sample disposal, the forms will be turned over to the Document Control Officer and placed into the project case file.

Project File

Documentation will be placed in single project file, which will be maintained by Quest. This file will consist of the following components:

- Agreements (filled chronologically);
- Correspondence (filed chronologically);
- Memos (filed chronologically); and
- Notes and data (filed chronologically by topic).

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation and field data will be filed with notes and data. Filed materials may be removed by authorized personnel on a temporary basis only.

B.4 Analytical Methods

Samples with the exception of PCDD/PCDF samples will be analyzed at STL-Edison located in Edison, New Jersey using the analytical methods listed in Table 3. Samples collected for analysis of PCDDs/PCDFs will be laboratory-screened using the Chemically-Activated Luciferase Expression (CALUX) bioassay method. This screening method is a highly sensitive and accurate test for measuring TEQ (as 2,3,7,8-TCDD) levels in soil. Ten percent of the screened analyses will be confirmed via CLP Method DLM 01.4. Screening of PCDD/PCDF samples will be conducted by CCI/XDS Inc. located in Durham, North Carolina.

B.5 Quality Control

Laboratory duplicates, laboratory blanks, standards, matrix spikes, matrix spike duplicates, field duplicates, trip blanks, and rinse blanks will be analyzed to provide the means for assessing data quality from both the laboratory and the field. A brief explanation of each QC sample type is provided below. Field and laboratory QC sample frequencies are summarized in Table 4.

B.5.1 Field QC Samples

Field Blanks

Field blanks will be used to access the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the site, which may cause sample contamination. Field blanks will be collected at a rate of one per day from sampling equipment (i.e. mixing bowl, spatula etc). Field blanks will be analyzed for all analytical parameters analyzed during the sampling day per sample matrix. Demonstrated analyte-free water obtained from the laboratory will be used for preparation of field blanks. Documentation will be provided by the laboratory, if requested. Field blank water shall not be held on site for more than two (2) consecutive calendar days.

Trip Blanks

Trip blanks consisting of methanol will be required for non-aqueous samples in accordance with the NJDEP methodology for the Field Extraction/Preservation of Soil Samples with Methanol for Volatile Organic Compounds, February 1997. For ground water samples, the trip blank will consist of a set (2) of 40-ml VOA purge vials filled at the laboratory with laboratory demonstrate analyte-free water. Trip blanks accompany the sample bottles that are prepared at the laboratory into the field and back to the laboratory, along with the collected samples for analysis. Trip blanks shall not be held on site for more than two (2) calendar days.

Field Duplicates

Field duplicate samples will be used to measure sampling reproducibility. One field duplicate will be collected for every 20 investigative samples (5%).

B.5.2 Laboratory QC Samples

Internal quality control procedures are specified in the analytical methods. These specifications include the types of QC checks required (method blanks, reagent/preparation blanks, matrix spikes and matrix spike duplicates, calibration standards, internal standards, surrogate standards, the specific calibration check standards, laboratory duplicate/replicate analysis), compounds and concentrations to be used, and the quality control acceptance criteria.

Method Blanks

Method blanks will serve as a measure of contamination attributed to a variety of sources including glassware, reagents, and instrumentation. The method blank will be initiated at the beginning of an analytical procedure and is carried through the entire process.

Matrix Spike/Matrix Spike Duplicate

Matrix spikes provide information about the effect of the sample matrix on digestion and measurement methodology. The Matrix Spike (MS) will serve as a measure of method accuracy in a given matrix. The MS and Matrix Spike Duplicate (MSD) together will serve as a measure of method precision. All organic matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples. Soil MS/MSD samples require double volume, and aqueous MS/MSD samples must be collected at triple the volume. One MS/MDS sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (i.e., ground water, soil).

Laboratory Duplicates

Laboratory duplicates will serve to measure method precision in inorganic analyses. Laboratory duplicate samples will be used to measure analytical reproducibility in the analysis of TAL Metals at a frequency of 1 per 20 samples (5%).

Surrogate Spikes

Surrogate spikes are organic compounds that have similar properties to those being tested. They will serve as indicators of method performance and accuracy in organic analyses.

B.5.3 Laboratory QA Program

The laboratory has written Quality Assurance/Quality Control program which provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA/QC program is coordinated and monitored by the Laboratory QAM.

The stated objectives of the laboratory QA/QC Program are to:

- Ensure that all procedures are documented, including any changes in administrative an/or technical procedures;
- Ensure that all analytical procedures are conducted according to sound scientific principles and have been validated.
- Monitor the performance of the laboratory by a systemic inspection program and provide for a corrective action as necessary; and
- Ensure that all data are properly recorded and archived.

All laboratory procedure are documented in writing as either Standard Operating Procedures (SOP) or Method Procedures (MP) which are edited and controlled by the Laboratory QAM. Internal quality control procedures for analytical services will be conducted by the laboratory in accordance with their standard operating procedures and the individual method requirements.

B.6 Instrument/Equipment Testing, Inspection and Maintenance

B.6.1 Field Equipment/Instruments

Field instruments will be checked and calibrated before they are shipped or carried to the field. These instruments will be checked and calibrated daily while in the field. Calibration checks will be performed and will be documented as outlined in the RIW. Critical spare parts will be readily available to minimize instrument down time.

B.6.2 Laboratory Equipment/Instruments

In order to prevent system downtime, minimize corrective maintenance costs, and ensure data validity, the laboratory will employ a system of preventative maintenance. General preventative maintenance procedures, many of which are unique to particular instruments, will be outlined in each instrument's operation manual. All routine maintenance will be performed as recommended by the manufacturer. The manuals also assist in the identification of commonly needed replacement parts, so that an inventory of these parts is maintained at the laboratory. It is the Section Supervisor's responsibility to make sure that the most current version of the operator manual will be available in the laboratory. Routine maintenance is performed by the analyst while external technicians may be called in for major repairs. In addition, an in-house instrument specialist who has received training for repair of all major pieces of laboratory equipment will be available.

A bound maintenance and repair log notebook will be kept with each instrument to record all routine and non-routine maintenance. Notation of the date and maintenance activities will be recorded every time service procedures are performed. This includes routine service checks by laboratory personnel as well as factory service calls. The return to analytical control following instrument repair will also be noted in laboratory maintenance logbooks.

B.7 Instrument/Equipment Calibration and Frequency

All standards used in the calibration of equipment will be traceable, directly or indirectly, to USEPA-approved reference materials. Standards received will be entered into standard receipt logs. Each analytical group will maintain standard preparation logs that track the preparation of standards used for calibration and QC purposes.

B.7.1 Field Instruments/Equipment

Field analytical equipment will be calibrated prior to each day's use, in accordance with the manufacturer's instructions, and recorded in the field logbook. Instruction manual for the operation of field analytical equipment will be available on site.

B.7.2 Laboratory Instruments

Calibration of laboratory equipment will occur as specified for the analytical methods used during the project. Whenever possible, calibration options will be utilized that most closely approximate those found in the current USEPA Statements of Works for laboratory analyses. The laboratory will maintain records of instrument calibration.

C. ASSESSMENT AND OVERSIGHT

C.1 Audits

Performance and system audits are a key mechanism for ensuring technical and procedural compliance with the RIW. The purposes of the audits are:

- To verify that the field and laboratory quality assurance procedures called for in the QAPP are properly followed and executed.
- To check that appropriate documents are properly completed and are kept current and orderly.
- To ensure that measurement systems are accurate.
- To identify nonconformance or deficiencies and to initiate necessary corrective actions.

The Project Manager, Laboratory Project Manager and the Project Quality Assurance Manager are responsible for ensuring conformance with standard operating procedures. Activities that have been selected for audit will be evaluated against specified requirements, which will include an evaluation of the method, procedures, and instructions. Documents and records will be examined as necessary to evaluate whether the QA program is effective and properly implemented. Reports and recommendations must be prepared on all audits and submitted to the project files.

C.1.1 Field Audits

Planning, scheduling, and conducting of QA audits and surveillance are required to verify that site activities are being performed efficiently in conformance with approved plans, standards, federal and state regulatory requirements, sound scientific practices, and contract requirements. Planned and scheduled audits will be performed to verify compliance with aspects of the QA program and to evaluate its effectiveness. Audits will include an objective examination of work areas, activities, processes, review of documents and records, interviews with project personnel, and review of plans and standards.

Internal review of the sampling program is conducted on a regular basis during the investigation phase. The reviews pay particular attention to the sampling program with respect to representativeness, comparability, and completeness of the specific measurement parameters involved.

Field documentation (e.g., COC, field daily sheets, and boring logs) will be reviewed as generated by the Project Manager or designee for accuracy, completeness, and compliance with QAPP requirements. Field sampling procedures are audited periodically by the Project Manager for compliance with QAPP procedures. The auditor checks that:

- Sampling protocols are being followed.
- Field measurements are done correctly.
- Samples are placed in proper containers.
- Samples are stored and transported properly.
- Field documentation is completed.

C.1.2 Laboratory Audits

Internal system audits are conducted by the Laboratory QAM. The audit is a qualitative evaluation of all components of the laboratory quality control measurement system. The audit serves to determine if all measurement systems are being used appropriately. The system audits are conducted to evaluate the following:

- Sample handling procedures;
- Calibration procedures;
- Analytical procedures;
- QC results;
- Safety procedures;
- Record keeping procedures; and
- Timelines of analysis and reporting.

In addition, as participants in various state and federal programs, laboratories are subject to external audits by the associated regulatory agencies. The focus of these audits is to assess the general laboratory practices and conformance to specific program protocol.

Laboratory performance is also review by the Laboratory QAM. The Laboratory QAM evaluates laboratory precision and accuracy through comparison of results of duplicate samples and analyses, and through review of QC samples, spikes, and blanks. Analytical results are checked by the Laboratory Project Manager or other client services individual prior to distribution.

C.2 Corrective Actions

Corrective actions may be required for two classes of problems: analytical and equipment problems and noncompliance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review. For noncompliance problems, a corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the proper project member. If the problem is analytical in nature, information on these problems will be communicated to the Project QAM and the Laboratory QAM who will in turn direct the information to the proper project member. Implementation of corrective action will be confirmed through the same channels.

The implementation of all corrective actions will be documented. No staff member will initiate corrective action without prior communication of finds through the proper channels. If corrective actions are insufficient, work may be stopped by stop-work order by the Project Manager.

C.2.1 Sample Collection/Field Measurements

Technical staff and project personnel will be responsible for reporting suspected technical or QA nonconformances or suspected deficiencies by reporting the situation to the Field Manager. The Field Manager will be responsible for assessing the suspected problems in consultation with the QAM on making a decision based on the potential for the situation to impact the quality of the data. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then a nonconformance report will be initiated by the Field Manager.

The Field Manager will be responsible for ensuring that corrective action for nonconformances are initiated by:

- Evaluating all reported nonconformances;
- Controlling additional work on nonconforming items;
- Determining disposition or action to be taken;
- Maintaining a log of nonconformances;
- Reviewing nonconformance reports and corrective actions take; and
- Ensuring nonconformance reports are included in the final site documentation in project files.

If appropriate, the Field Manager will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed. Corrective action for field measurements may include:

- Repeat the measurement to check the error;
- Check for all proper adjustments for ambient conditions such as temperature;
- Check the batteries;
- Recalibration
- Replace the instrument or measurement devices; or
- Stop work (if necessary).

C.2.2 Laboratory Analyses

Corrective actions are required whenever an out-of-control even or potential out-of-control even is noted. The investigative action taken is somewhat dependent on the analysis and the event. Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy;
- Blanks contain target analytes above acceptable levels;
- Undesirable trends are detected in spike recoveries or RPD between duplicates;
- There are unusual changes in detection limits;

- Deficiencies are detected by the QA Department during internal or external audits or from the results of performance evaluation samples; or
- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity and so on. If the problem persists or cannot be identified, the matter is referred to the Laboratory Supervisor, Manager and/or QA Department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the QA Department. Corrective action may include:

- Re-analyzing the samples, if holding time criteria permits;
- Resampling and analyzing;
- Evaluating and amending sampling procedures; or
- Accepting data and acknowledging the level of uncertainty.

If resampling is deemed necessary due to laboratory problems, the Project Manager must identify the necessary approach including cost recovery from the laboratory for the additional sample effort.

C.3 Quality Assurance Report To Management

The final report will contain QA sections that summarize data quality information collected during the project. Quality control reports will be submitted as documentation of compliance with QA/QC objectives. The reports also serve to update the status of the project and to indicate any changes or deviations from the initial plan. Items in the report may include:

- Changes in QA Project Plan;
- Summary of QA/QC programs;
- Results of system and performance audits;
- Significant QA/QC problems, recommended solutions, and results of corrective action;'

- Data quality assessment;
- Evaluation of compliance with data quality objectives and the resulting impact on decision making; and
- Limitations on the use of measurement data.

D. DATA VALIDATION AND USABILITY

D.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks, data sheets, and/or forms. Such data will be reviewed by the Field Manager for adherence to the RIW and consistency of data. Any concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and as necessary, incorporated in to the data evaluation process.

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the Field Manager and the QAM. The Field Manager will recalculate at least five percent of data reductions. Field documentation and data reduction prepared by field personnel will be reviewed by the Field Manager and QAM, if necessary. Logs and documents will be checked for:

- General Completeness;
- Readability;
- Usage of appropriate procedures;
- Appropriate instrument calibration and maintenance;
- Reasonableness in comparison to present and past data collected;
- Correct sample locations; and
- Correct calculations and interpretations.

Where appropriate, field data forms and calculation will be processed and included in appendices to the appropriate repot. The original field logs, documents, and data reductions will be kept in the project file at the Quest office in Clinton, New Jersey.

D.2 Laboratory Data Reporting

A primary review of the generated data will be conducted by the analyst. One of the most important aspects of primary review is to make sure that the test instructions are clear; and that all project-specific requirements have been understood and followed. Once the analysis is complete, the primary reviewer will ensure that: sample preparation

information is complete, accurate, and documented; calculations have been performed correctly; quantitation has been performed accurately; qualitative identifications are accurate; client-specific requirements have been followed; method and process SOPs have been followed; method QC criteria have been met; QC samples are within established limits; dilution factors are correctly recorded and applied; non-conformances and/or anomalous data have been properly documented and appropriately communicated; and COC procedures have been followed. If the instrument calibration and recoveries of all quality control samples are within specified tolerances, then the data will be presented for secondary review. If instrument calibration or the recoveries of any quality control samples exceed specified tolerances, then affected sample results will be evaluated and may be submitted for re-analysis. Any manual integration that occurs will be dated and signed and, if appropriate, noted in the case narrative.

Secondary review (a complete technical review) will be conducted by laboratory Section Supervisors or data review personnel to determine if analytical results are acceptable. All calibrations, manual calculations and transcriptions are checked for accuracy, and quality control sample results are evaluated against specified tolerances. If instrument calibration and recoveries of all quality control samples are within specified tolerances, then the data will be presented to the Project Manager for final (tertiary) review.

Laboratory Director or senior chemistry personnel will perform final review of the data to determine if all analytical results of a sample(s) are consistent. Correlation of results for different parameters of a sample will be evaluated at this time before the data is presented in a final report to the client. If discrepancies or deficiencies exist in the analytical results, then corrective action will be taken.

A majority of the data will be reported using NJDEP "Reduced Deliverables" format. Data packages will include, at a minimum, the following items:

- Title
- Laboratory name, address, telephone number, contact person
- Unique Laboratory Project Number
- Total Number of Pages (report must be paginated)
- Name and address of Client

- Client Project Name (if applicable)
- Laboratory Sample Identification
- Client Sample Identification
- Matrix and/or Description of Sample
- Dates: Sample Receipt, Collection, Preparation and/or Analysis Date
- Definition of Data Qualifiers
- Reporting Units
- Test Method

The following will be required where applicable to the specific test method or matrix:

- Solid Samples: Indicated Dry or Wet Weight
- Indication by flagging where results are reported below the quantitation limit.

A Project Narrative and/or Cover Letter will be included with each project report and at a minimum will include an explanation of any and all of the following occurrences:

- Non-Conformances
- Compromised Sample Receipt
- Method Deviations
- QC Criteria Failures

The Laboratory Director or designee will authorize the release of the project report with a signature.

Where amendments to project reports are required after issue, these shall be in the form of a separate document and/or electronic data deliverable. The revised report will be clearly identified as revised with the date of revisions and the initials of the person making the revisions. Specific pages of a project report may be revised using the above procedure with an accompanying cover letter indicating the page numbers of the project revised. The original version of the project report must be kept intact and the revisions and cover letter included in the project files.

Subcontracted data will be clearly identified as such, and the name, address, and telephone number for the laboratory performing the test is included in the project report. Test results from more than one facility of the Laboratory will be clearly identified with the name of the facility that performed the testing, address, and telephone number for that facility.

Sample results on the report forms will be corrected for dilutions. Soil samples are reported on a dry weight basis. Unless otherwise specified, results will be reported uncorrected for blank contamination.

For ten percent of the non-PCCD/PCDF investigative samples, the data reporting package will be expanded to include all supporting documentation required of a NJDEP "Regulatory Package". In addition, all of the samples with a full PCDD/PCDF analysis will be reported with a NJDEP Regulatory Package. This additional documentation includes, but is not limited to, all raw data required to recalculate any result including printouts, chromatograms, and quantitation reports. The report also will include: standards used in calibration and calculation of analytical results, sample extraction, digestion and other preparation logs; standard preparation logs, instrument-run logs; and moisture content calculations.

D.3 Data Validation

NJDEP Regulatory Package data reports will be validated, if requested by USEPA, in accordance with USEPA Region 2 guidance. Validation of laboratory data packages will include an assessment of compliance with method guidelines and project specific requirements. Specifically included are an evaluation of holding times, blank contamination, calibration requirements (initial and continuing), surrogate spike recovery, matrix spike and duplicate recoveries, instrument performance, and compound identification, as applicable.

The following steps are included as part of the data validation process:

- Evaluation of completeness of data package.
- Verification that field chain-of-custody forms were completed and that samples were handled properly.

- Verification that holding times were met for each parameter. Hold times exceedances, should they occur, will be documented. Data for all samples exceeding holding time requirements will be flagged as either estimated or rejected. The decision as to which qualifier is more appropriate will be made on a case-by-case basis.
- Verification that parameters were analyzed according to the methods specified.
- Review of QA/QC data (i.e., assurance that duplicates, blanks, and spikes were analyzed on the required number of samples as specified in the method; verification that duplicate and matrix spike recoveries were acceptable).
- Investigation of anomalies identified during review. When anomalies are identified, they will be discussed with the Project Manager an/or Laboratory Manager, as appropriate.

Deficiencies discovered as a result of data validation, as well as the corrective actions implemented in response, will be documented an submitted in the form of a written report with supporting documentation supplied as check sheets. EPA Function Guidelines and EPA Region 2 Modifications to the Functional Guidelines will be used as guidance on data validation procedures. When specific guidance exists, the project specifications and method requirements will be utilized.

D.4 Reconciliation with Data Quality Objectives

The QA Manager in conjunction with the Project Manager will determine whether field and analytical data or data sets do not meet the requirements necessary for decision making. The results of the measurements will be compared to the DQO requirements set forth in this QAPP. As data are evaluated, anomalies in the data or data gaps may become apparent to the data users. The DQOs will be considered to be satisfied if the data are sufficient to accomplish the goals of the remedial investigation. Data that do not meet the data users needs will be identified and appropriately noted in the project database so the decision makers are aware of its limitation.

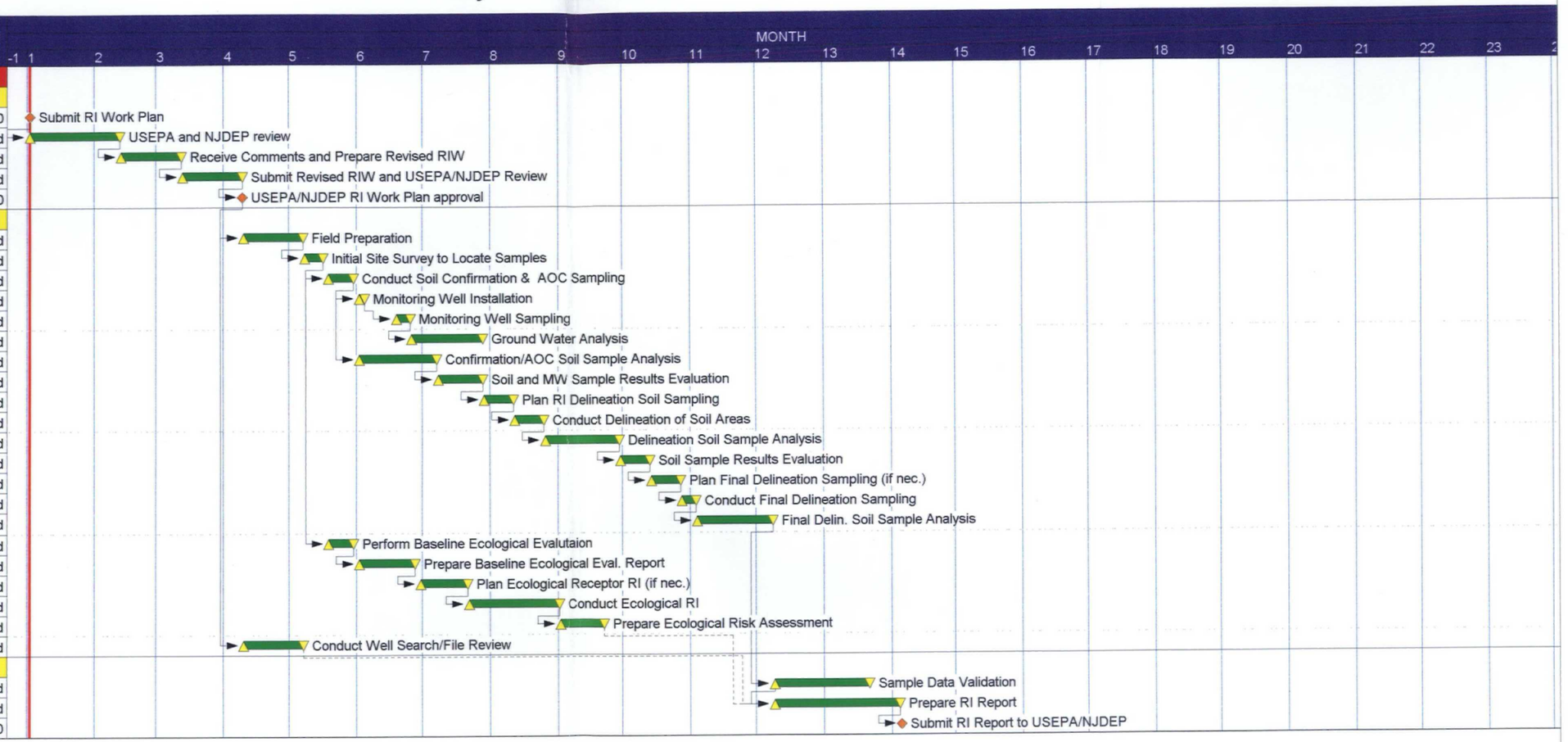
TABLES

Prepared by Quest Environmental and Engineering Services, Inc

Table 1
Remedial Investigation Work Plan Schedule
Bayonne Barrel & Drum

Prepared for demaximis, inc

Act ID	Description	Orig Dur
RI - Remedial Investigation		
PLAN - Work Plan and Approvals		
1000	Submit RI Work Plan	0
1010	USEPA and NJDEP review	30d
1020	Receive Comments and Prepare Revised RIW	20d
1030	Submit Revised RIW and USEPA/NJDEP	20d
1040	USEPA/NJDEP RI Work Plan approval	0
RI - RI Activities		
1050	Field Preparation	20d
1060	Initial Site Survey to Locate Samples	7d
1070	Conduct Soil Confirmation & AOC Sampling	10d
1072	Monitoring Well Installation	3d
1076	Monitoring Well Sampling	5d
1077	Ground Water Analysis	22d
1080	Confirmation/AOC Soil Sample Analysis	25d
1090	Soil and MW Sample Results Evaluation	15d
1100	Plan RI Delineation Soil Sampling	10d
1110	Conduct Delineation of Soil Areas	10d
1120	Delineation Soil Sample Analysis	25d
1130	Soil Sample Results Evaluation	10d
1140	Plan Final Delineation Sampling (if nec.)	10d
1150	Conduct Final Delineation Sampling	5d
1160	Final Delin. Soil Sample Analysis	25d
1260	Perform Baseline Ecological Evalutaion	10d
1270	Prepare Baseline Ecological Eval. Report	20d
1280	Plan Ecological Receptor RI (if nec.)	15d
1310	Conduct Ecological RI	30d
1330	Prepare Ecological Risk Assessment	15d
1340	Conduct Well Search/File Review	20d
REP - Reporting		
1170	Sample Data Validation	30d
1180	Prepare RI Report	40d
1190	Submit RI Report to USEPA/NJDEP	0



- Early start point
- Early finish point
- Early bar
- Progress bar
- Critical bar
- Summary bar
- Progress point
- Critical point
- Summary point
- Start milestone point
- Finish milestone point

Date	Revision	Checked	Approved
01JAN03	Revision 1	KS	BL

TABLE 2

Quality Assurance Project Plan - Remedial Investigation
Bayonne Barrel and Drum Site
Newark, New Jersey

DATA QUALITY OBJECTIVES

Data Type	Investigation Objectives	Data Use(s)[1]	Reporting Levels
Soil			
Volatile Organics	– Define extent of contamination – Determine boundaries of affected areas – Identify concentration ranges present	SC/RI	10% NJDEP Regulatory Package Balance NJDEP Reduced Deliverables
Semi-Volatile Organics	– Define extent of contamination – Determine boundaries of affected areas – Identify concentration ranges present	SC/RI	
Pesticides/PCBs	– Define extent of contamination – Determine boundaries of affected areas – Identify concentration ranges present	SC/RI	
Metals	– Define extent of contamination – Determine boundaries of affected areas – Identify concentration ranges present	SC/RI	
PCDD/PCDF	– Define extent of contamination – Determine boundaries of affected areas – Identify concentration ranges present	SC/RI	100% NJDEP Regulatory Package

Notes:
(1) Data Uses

SC/RI Site Characterization/Remedial Investigation

PCBs Polychlorinated biphenyls
PCDD/PCDF Polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TAL Target Analyte List
TCL Target Constituent List

TABLE 3
Quality Assurance Project Plan - Remedial Investigation
Bayonne Barrel and Drum Site
Newark, New Jersey

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Parameter	Method[1]	Bottle Type	Preservation	Holding Time[2]
Soil				
TCL Volatile Organics + 10 TICs	SW-846 8260	40-ml VOA Vial with 25 ml methanol and Teflon®-lined lid.	Cool to 4° C.	14 days to analysis
TCL Semi-Volatile Organics + 20 TICs	SW-846 8270	250-ml glass jar with Teflon®-lined lid.	Cool to 4° C.	14 days to extraction, 40 days to analysis
TCL Pesticides/PCBs	SW-846 8082	250-ml glass jar with Teflon®-lined lid.	Cool to 4° C.	14 days to extraction, 40 days to analysis
PCDD/PCDF (Dioxins/Furans)	Screening: CALUX Method	250-ml glass jar with Teflon®-lined lid.	Cool to 4° C.	30 days to extraction, 45 days to analysis
	Full: DLM 01.4 CLP			
TAL Metals (except mercury)	SW-846 6010	250-ml glass jar with Teflon®-lined lid.	Cool to 4° C.	180 days to analysis
Mercury	SW-846 7471			28 days to analysis
Total Petroleum Hydrocarbons	EPA 418.1m	250-ml glass jar with Teflon®-lined lid.	Cool to 4° C.	28 days to analysis

Notes:

(1) All methods are USEPA SW-846 or as indicated

(2) Holding times are from date of collection.

PCBs Polychlorinated biphenyls

PCCD Polychlorinated dibenzo-p-dioxin

PCCF Polychlorinated dibenzofurans

TCL Target Compound List

TAL Target Analyte List

TIC Tentatively Identified Compounds via a Library Search

CLP Contract Laboratory Program

US Environmental Protection Agency. Office of Solid Waste and Emergency Response. Test Methods for Evaluating Solid Waste. SW-846 3rd ed. 1995.

TABLE 3
Quality Assurance Project Plan - Remedial Invesstigation
Bayonne Barrel and Drum Site
Newark, New Jersey

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Parameter	Method	Bottle Type	Preservation	Holding Time[(1)]
Ground Water				
TCL Volatile Organics + 10 TICs	EPA 624	40-ml VOA Vials (3) with Teflon®-lined septum lid.	HCl to pH <2 Cool to 4° C.	14 days preserved to analysis
TCL Semi-Volatile Organics + 20 TICs	EPA 625	1-Liter Amber Glass Jar (2) with Teflon®-lined Lid	Cool to 4° C.	7 days to extraction, 40 days to analysis
TCL Pesticides/PCBs	EPA 608	1-Liter Amber Glass Jar (2) with Teflon®-lined Lid	Cool to 4° C.	7 days to extraction, 40 days to analysis
TAL Metals (except mercury)	EPA 200.7 ICP	500-ml Polyethylene Container and Lid	HNO3 to pH <2 Cool to 4° C.	6-months to analysis
Mercury	EPA 245.1 CV			28 days to analysis

Notes:

(1)	Holding times are from date of collection.
PCBs	Polychlorinated biphenyls
TCL	Target Compound List
TAL	Target Analyte List
TIC	Tentatively Identified Compounds via a Library Search
ICP	Inductively Coupled Plasma Atomic Emission Spectroscopy
CV	Manual Cold Vapor
HCl	Hydrochloric Acid
HNO_3	Nitric Acid

TABLE 4
Quality Assurance Project Plan - Remedial Investigation
Bayonne Barrel and Drum Site
Newark, New Jersey

DATA SUMMARY OF PLANNED ANALYSES (including QC)

Parameter	Environmental Sample Quantity (Estimated No.)	Field QC Analyses						Laboratory QC Sample						
		Trip Blank		Field Blank		Field Duplicate		Matrix Spike		Matrix Spike Dup.		Lab Duplicate		
		Freq.	No.	Freq.	Estimated No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Total
Soil														
TCL Volatile Organics + 10 TICs	38	NA	4	1/day	4	1/20	2	1/20	2	1/20	2	NA	--	52
TCL Semi-Volatile Organics + 20 TICs	28	NA	--	1/day	4	1/20	2	1/20	2	1/20	2	NA	--	38
PCBs	140	NA	--	1/day	10	1/20	7	1/20	7	1/20	7	NA	--	171
Pesticides	14	NA	--	1/day	4	1/20	1	1/20	1	1/20	1	NA	--	21
TAL Metals	28	NA	--	1/day	4	1/20	2	1/20	2	1/20	2	1/20	2	40
Total Petroleum Hydrocarbons	36	NA	--	1/day	4	1/20	2	1/20	2	1/20	2	NA	--	46
Dioxin/Furan (Screen)	110	NA	--	1/day	--	1/20	5	1/20	--	1/20	--	NA	--	115
Dioxin/Furan (Full Analysis)	11	NA	--	1/day	6	1/20	2	1/20	2	1/20	2	NA	--	23

Notes:

Dup	Duplicate
Freq.	Frequency
NA	Not Applicable
No.	Number
PCBs	Polychlorinated biphenyls
QC	Quality Control
TCL	Target Compound List
TAL	Target Analyte List
TIC	Tentative Identified Compounds via a library search

TABLE 4
Quality Assurance Project Plan - Remedial Investigation
Bayonne Barrel and Drum Site
Newark, New Jersey

DATA SUMMARY OF PLANNED ANALYSES (including QC)

Parameter	Environmental Sample Quantity (Estimated No.)	Field QC Analyses						Laboratory QC Sample						
		Trip Blank		Field Blank		Field Duplicate		Matrix Spike		Matrix Spike Dup.		Lab Duplicate		
		Freq.	No.	Freq.	Estimated No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Total
Ground Water														
TCL Volatile Organics + 10 TICs	14	NA	2	1/day	2	1/20	1	1/20	1	1/20	1	NA	--	21
TCL Semi-Volatile Organics + 20 TICs	14	NA	--	1/day	2	1/20	1	1/20	1	1/20	1	NA	--	19
Pesticides/PCBs	14	NA	--	1/day	2	1/20	1	1/20	1	1/20	1	NA	--	19
TAL Metals	14	NA	--	1/day	2	1/20	1	1/20	1	1/20	1	1/20	1	20

Notes:

Dup	Duplicate
Freq.	Frequency
NA	Not Applicable
No.	Number
PCBs	Polychlorinated biphenyls
QC	Quality Control
TCL	Target Compound List
TAL	Target Analyte List
TIC	Tentative Identified Compounds via a library search